PRE-SERVICE TEACHERS' UNDERSTANDINGS OF HOW SOCIAL VALUES CAN BE INTEGRATED IN LIFE SCIENCES TEACHING AND LEARNING

Eyitayo Julius Ajayi, & Lydia Mavuru
Department of Science and Technology Education, University of Johannesburg (South Africa)

Abstract

The National Curriculum Statement (NCS) Grades R-12, comprising the Curriculum Assessment and Policy Statement (CAPS), is currently used for teaching, and learning in South African schools. Since the dawn of democracy, school curricula documents in South Africa have been built on 10 fundamental social values that inspired the country's post-apartheid Constitution Act 108 of 1996. These social values comprise democracy, social justice and equity, equality, non-racism, and non-sexism, Ubuntu (human dignity), open society, accountability, rule of law, respect, and reconciliation. The Manifesto on Values, Education and Democracy is another education policy statement which accentuates these values. Consequently, the NCS is underscored by a curriculum philosophy that urges teachers to equip learners with values during classroom teaching of all approved subjects, Life Sciences included. Such a stance is consistent with global efforts at promoting values education. Therefore, the study reported herein investigated pre-service teachers' understandings of the teaching strategies suitable for integration of some values into classroom teaching of Life Sciences. In a qualitative study underpinned by perception-value as the theoretical framework, 70 Life Sciences pre-service teachers were selected to participate in the study. The participants were in their final (fourth) year of studying for a Bachelor of Education Degree and were enrolled for a Life Sciences methodology module at a university in South Africa. These teachers had taught in diverse school contexts as part of work integrated learning, hence were knowledgeable about the nature of South African classroom contexts. In collecting data, each participant was tasked to: 1. select a topic/concept from the Life Sciences CAPS document; 2. identify values they can inculcate in learners; and 3. critically discuss how the identified values may be integrated into Life Sciences classroom teaching of the chosen topic/concepts. Each participant's submission formed the data and was subjected to content and thematic analysis. From the analysis of data, the following strategies were identified as suitable for inculcating values in the learners whilst teaching various Life Sciences topics: discussion; role playing/mock sessions; collaborative group work; engaging in debates; using analogies; making reference to learners' lived experiences; and using examples familiar to learners' lives. The discussed teaching strategies were indicative of how the South African philosophy of Ubuntu is critical in developing values in learners. The findings of the study have implications on not only pre- and in-service teacher professional development but also inform how the societal issues may be mitigated through the teaching of values.

Keywords: Life Sciences, pre-service teachers, teaching strategies, values, Ubuntu.

1. Introduction

The National Curriculum Statement (NCS), Grades R-12, a comprehensive policy document embodying the Curriculum and Assessment Policy Statement (CAPS) for each approved subject, currently guides teaching and learning in South African schools (Department of Basic Education [DBE], 2011a). Rooted in post-apartheid ideals, the NCS is underscored by a principle which emphasizes the need for teachers to instil social values in learners during classroom teaching across all subjects. Hence, this principle aligns with the ethos of values education described by Oeschger et al. (2022) as value formation conveyed through educational goals usually set by curricular documents. Shaped by a series of reforms and the principles of the South African Constitution, the NCS reflects abstract notions of value, which vary in interpretation (Askeland, 2020; DBE, 2011a; Frese, 2015). Schwartz (2012) delineates six key features of values, highlighting their emotive nature, motivational role, and overarching significance. Values, whether perceived as nouns or verbs, denote worth and importance, resonating with the essence of significance (Magendanz, 2003). Embedded within the post-apartheid South African Constitution are fundamental social values, including democracy, social justice, Ubuntu (human dignity), and reconciliation (DoE, 2001; Botha et al., 2016). Ubuntu, in particular, encapsulates these core values, embodying interconnectedness and interrelatedness (Dube, 2023). However, implementing values-driven education poses challenges, requiring teachers to be discerning and innovative in achieving such outcomes (García-González et al.,

2020). Of particular concern is how pre-service teachers engage with curricular principles, such as integrating social values into teaching practices. Understanding the perspectives of pre-service teachers becomes pivotal for teacher educators, informing pedagogical approaches (García-González et al., 2020). Consequently, against the backdrop of illuminating pathways for values-based teaching and learning (values education), this study sought to explore pre-service teachers' understandings of integrating social values within Life Sciences education (teaching and learning).

2. Literature review

The abstract nature of value(s) as a social construct renders it elusive, lacking physical presence and existing only as a conceptualization dependent on perspective (Frese, 2015; Seewann & Verwiebe, 2020). Social value(s) manifests as intangible nouns such as honesty, love, and respect, influencing human behavior across various contexts (Eyal et al., 2009). Rhodes and Roux (2004) identify factors shaping social values, including moral, aesthetic, political, legal, and religious dimensions. These factors give rise to key values reflected in societal activities, encompassing ideologies, ethics, humanitarian principles, and cultural norms (Rhodes & Roux, 2004) which align with the fundamental social values enshrined in the post-apartheid South African Constitution. Hence, within educational contexts, social values permeate South Africa's curricular documents, where they were integrated across learning areas. The initiative titled 'Values, Education, and Democracy: Report of the Working Group on Values in Education' aimed to identify key values for integration into the South African curriculum (Ferreira & Schulze, 2014; Rhodes & Roux, 2004). This effort culminated in the development of the "Manifesto on Values, Education, and Democracy" (DoE, 2001), aligning with the ten fundamental Constitutional values previously mentioned. The current NCS Grades R–12 serves as the cornerstone of educational policy in South Africa, shaping teaching and learning practices across various subjects. Plausibly, the NCS is deeply rooted in South Africa's historical context of apartheid and reflects ideological and socio-political inspirations (Gervedink et al., 2013; Hildebrand, 2007).

Furthermore, post-apartheid educational reforms in South Africa emphasized a values-driven curriculum, evidenced by the implementation of the "Guidelines for Inclusive Teaching and Learning" (DBE, 2010) and the "Guidelines for Responding to Learner Diversity in the Classroom" (DBE, 2011b). These initiatives were specifically geared towards fostering social justice, equity, and development within the framework of a democratic South Africa (Chisholm, 2012). As previously elucidated, a fundamental tenet of the NCS Grades R–12 is the mandate for educators to imbue learners with the social values enshrined in the South African Constitution through the teaching of CAPS-approved subjects. Building upon this principle, Jeannette and Julialet (2003) assert that in South Africa, issues such as violence, indiscipline, and high crime rates stem from a deficiency in values conducive to a healthy society and a well-disciplined school environment. Such challenges are not unique to South Africa but are part of a global phenomenon (Simuforosa & Rosemary, 2014) often resulting in teachers bearing the brunt of blame. In light of these circumstances, this study proposes leveraging classroom teaching of life sciences concepts as a means to impart social values. However, as future teachers, exploring pre-service teachers' understanding of how this can be done creates an avenue for cultivating a positive value system among learners. By integrating values education into the curriculum, educators can play a pivotal role in nurturing socially responsible individuals and fostering a conducive learning environment aligned with the principles of the NCS.

3. Research design

We employed a qualitative approach to explore pre-service teachers' understanding of how social values can be integrated in life sciences education in relation to the NCS's philosophy of 'equipping learners with values'. Drawing from interpretivist and constructivist paradigms, we adopted a qualitative case study methodology to facilitate the exploration. To explore how pre-service teachers may implement the curriculum philosophy in real time classroom LS teaching and learning we used the CAPS for Life Sciences as the context within which their understanding was examined. Participants in the study comprised 70 final-year students enrolled in a Bachelor of Education program, specifically focusing on teaching Life Sciences in high schools. Moreover, the participants had taught in diverse school contexts as part of work integrated learning, hence were knowledgeable about the nature of South African classroom contexts. All participants provided consent for participation. The authors employed Bowen's (2009) approach to document analysis to collect and analyze data from the CAPS for Life Sciences. We focused on understanding the curriculum principle of 'equipping learners with values' and how it translates into classroom teaching. The approach involved iterative steps of skimming, reading, and interpretation, leading

to the identification of relevant textual data to understand the curriculum principle. The participants were then taught about the process.

Subsequently, participants were tasked with analyzing an extract from the Manifesto on Values Education and Democracy (MVED) and selecting a Life Sciences topic from the CAPS for Life Sciences. They were instructed to identify constitutional values incorporated in their selected topics and discuss teaching strategies by which the identified values can integrated in classroom teaching of the topics. Data collected from their responses formed the basis of our study. Data analysis encompassed content and thematic analyses (Bowen, 2009), involving coding and category construction based on the characteristics of the data. Thematic analysis facilitated the identification of patterns and themes within participants' responses, guiding the interpretation of findings. Overall, this methodological approach allowed us to explore the participants' understanding regarding the incorporation of values into Life Sciences instruction and to uncover insights into suitable teaching strategies for value integration.

4. Results

From the analysis of data, the participants suggested teaching strategies which may be achieved either during real-time teaching in the class or outside the classroom in direct or indirect relation to the topics taught. The following strategies were identified as suitable for inculcating values in the learners whilst teaching various Life Sciences topics: drawings/illustrations; discussion; visitations, role playing/mock sessions; collaborative group work; engaging in debates; using analogies; making reference to learners' lived experiences. Some of the strategies are represented in the three themes enunciated below. The values to be integrated, specific topics and teaching strategies (Bold and italicized) are as reflected in the excerpts derived from the participants (using pseudonyms). Ultimately, how the suggested teaching strategies were indicative of how the South African philosophy of Ubuntu is critical in developing values in learners. Three themes are presented. All names given are pseudonyms.

4.1. Theme 1: Teaching strategies to inculcate values in direct relation with topic

Excerpt 1 that follows explicates an example of how this theme was expressed in one of the pre-service teachers Johnson's response.

Johnson: …*The first value being **equality** can be integrated when teaching the **structure of the human ear**. Here the teacher can **draw** the structure of outer, middle and inner parts of the human ear. After that he or she can describe how sound waves travel from the outer ear until they reach the inner ear, and explain why a person cannot hear if one of the parts does not work. For example, when the cochlea found in the inner ear is damaged, the recipient will not hear anything. This will make learners to realize that all parts of the ear are equally important to make a person to hear sound. The teacher can then relate this to the society and tell learners that all people in the society are equally important to make the society work. For example, clinics need nurses, cleaners, doctors and patients so that they can function efficiently. Without one of these, they will not function accordingly.*

Johnson suggested the use of ***drawings or illustrations*** as a strategy to teach the value of ***equality*** incorporated in the teaching of the topic of ***structure of the human ear***. Using the illustrations/drawings, Johnson noted the importance and role played by the different parts of the ear for sound waves to be detected. In essence, all the parts of the human ear are of equal importance for sound waves to be transmitted and detected appropriately. Correspondingly, the value of Ubuntu (interdependence) is exhibited among the different parts of the outer, middle and inner ear.

4.2. Theme 2: Teaching strategies to inculcate values not in direct relation with the topic

Excerpt 2 that follows enumerates an example of how this theme was enunciated in one of the pre-service teachers, Debora's response.

Debora: …*I will ask the learners to **discuss** ways to **use water** to prevent water from running out and w**hile one learner is speaking, I will urge the others to actively listen** by posing follow-up questions or asking them to summarize what their peer said. By doing so, I will provide a platform for learners to contribute their ideas, making them a part of the lesson, which will encourage meaningful learning of the topic and help them comprehend, appreciate, and respect the different viewpoints of their peers.*

Debora's understanding of the strategy of ***discussions*** to teach the topic on the '***use of water***' for inculcating the values of ***respect and responsibility*** was not in direct relation with the concepts taught. However, the strategy involves how the teacher mediates or facilitates the discussions in a way to ensure mutual respect among the learners. Hence, Debora indicated that she will ensure that w*hile one learner*

speaks, she would urge the other learners to actively listen. Therefore, learners learn to respect one another while the teacher *provides a platform for learners to contribute their ideas, thereby making them to be part of the lesson*. Each learner is allowed to take **responsibility** of their explanation(s) during the discussion to enhance an interactive and learner-centred classroom. Ultimately, the value of Ubuntu is espoused in the teaching strategy as each learner's comprehension of the topic taught is inspired by other learners' contributions (interdependence) during the discussions.

4.3. Theme 3: Teaching strategies involving outside-class activities (Visitation)

Excerpt 3 that follows enumerates an example of how this theme was expressed in one of the pre-service teachers, Lucky's response.

Lucky**:** *…As we discuss the **water availability** subtopic in class, I would encourage the learners by asking them if they have experienced any issues when it comes to water availability in their areas and what they think could be the cause for such an issue. In this manner, they will communicate and participate in investigating the causes of this issue if they do not already know it. The learners can **go to the municipal offices [visitation]** to enquire in order to get valid responses. Considering that as teachers we have a responsibility of having to be role models and lead by example, I would also go to the relevant offices to help learners find the information we need. This will teach learners how important **participation [responsibility/accountability]** is in the context of nation building.*

Unlike in Themes 1 and 2, Lucky suggested a teaching strategy that will take the learners outside of the classroom environment. This teaching strategy is in relation to a Grade 11 main topic on "***Human impact on the environment: Current crises for human survival: Problems to be solved within the next generation" (DBE, 2011a, p. 51) with a specific focus on water availability and its quality***. Hence, the strategy involves a ***visit to the municipal office*** in charge of water supply to find out about issues related to water availability or shortages. This strategy becomes germane especially in relation to the way South Africa has been experiencing erratic power supply, coupled with a shortage of water supply in recent times. According to Lucky, this strategy will be useful to teach learners about the ***values of responsibility/accountability*** because there should be someone in the municipal office who had a responsibility but failed to do do his/her work appropriately, hence failing to take accountability for it. Therefore, the value of Ubuntu is expresed in the teaching strategy as it elaborates how the citizens' access to quality water is depedent on the proper functioning of all personnel of the municipal office. Similarly, the strategy implies how citizens must be responsible for the appropriate uses of water and care for water-related public equipment.

5. Discussions and conclusions

Notwithstanding that the NCS, inspired by a post-apartheid Constitution of South Africa, is established on social values, cases of injustice, racial discrimination and human rights abuses are still prevalent, especially among youths, 20 years into democracy in the country (Roux & Janse van Rensburg, 2017). Considering this situation, "the explicit development and teaching of applicable and appropriate values have become an urgent need" (Roux & Dasoo, 2020, p. 1). However, the NCS is underscored by a principle which urges teachers to equip learners with social values, exemplified by ten fundamental constitutional values, during classroom teaching of all approved subjects. A balanced curriculum theory and teacher pedagogical practices is essential within schooling contexts in South Africa for appropriate implementation of the curricular principle. Therefore, how pre-service teachers understood the curricular principle with respect to how social values can be integrated in Life Sciences teaching and learning formed the fulcrum of discourse in this study. From the analysis of data, the following strategies were identified as suitable for inculcating values in the learners whilst teaching various Life Sciences topics: discussion; role playing/mock sessions; collaborative group work; engaging in debates; using analogies; making reference to learners' lived experiences; and using examples familiar to learners' lives. The discussed teaching strategies were indicative of how the South African philosophy of Ubuntu is critical in developing values in learners. The findings of the study have implications on not only pre- and in-service teacher professional development but also inform how the societal issues may be mitigated through the teaching of values.

References

Askeland, H. (2020). Values—Reviewing the construct and drawing implications for values work in organisation and leadership. In H. Askeland, G. Espedal, B. Jelstad, & S. Sirris (Ed.) *Understanding values work institutional perspectives in organizations and leadership* (pp. 15-34). Palmgrave Macmillan.

Botha, A., Joubert, I. & Hugo, A. (2016). 'Children's perceptions of democratic values: Implications for democratic citizen education', *South African Journal of Childhood Education, 6*(1), a343. http://dx.doi.org/10.4102/sajce.v6i1.343

Bowen, A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal, 9*, 2, 27-40. http://doi.org:10.3316/QRJ0902027.

Chisholm, L. (2012). Apartheid education legacies and new directions in post-apartheid South Africa. *Storia delle donne, 8*, 81-103.

Department of Basic Education (2010). *Guidelines for inclusive teaching and learning.* https://www.gov.za https://msmonline.co.za/wp-content/uploads/2018/05/Guidelinesfor-Inclusive-Teaching-and-Learning-June-2010.pdf

Department of Basic Education (2011a). Curriculum and assessment policy statement Grades 10–12: Life sciences.https://www.education.gov.za/LinkClick.aspx?fileticket=_yUNfV0A_8o%3D&tabid=570 &portalid=0&mid=1558

Department of Basic Education (2011b). Guidelines for responding to learner diversity in the classroom Grades R–12. https://www.inclusive-education-in-action.org/resources/guidelines-responding-learner-diversity-classroom-throughcurriculum-and-assessment

Department of Education (2001). The manifesto on values, education and democracy. Retrieved from: https://www.gov.za

Dube, F. (2023). Ubuntu: An underutilised foundational constitutional principle of South African environmental law. *Journal of Law, Society and Development 10*, 1-15. https://doi.org/10.25159/2520-9515/13512

Eyal, T., Michael, S., Yaacov, T., Nira, L., & Shelly, C. (2019). When values matter: Expressing values in behavioral intentions for the near vs. distant future. *Journal of Experimental Social Psychology, 45*, 35-43.

Ferreira, C., & Schulze, S. (2014). Teachers' experience of the implementation of values in education in schools: "Mind the gap." *South African Journal of Education, 34*(1), 1-13. http://dx.doi.org/10.15700/201412120939

Frese, M. (2015). Cultural practices, norms, and values. *Journal of Cross-Cultural Psychology, 46*(10), 1327-1330. https://doi.org/10.1177/0022022115600267

García-González, E, Jiménez -Fontana, R., Azcárate, & Azcárate, P. (2020). Education for sustainability and the sustainable development goals: Pre-service teachers' perceptions and knowledge. *Sustainability, 12*(18), 7741. https://doi.org/10.3390/su12187741

Gervedink, N., Pieters, M., & Voogt, J. (2013). Influence of culture on curriculum development in Ghana: An undervalued factor? *Journal of Curriculum Studies, 45(*2), 225-250. https://doi.org/10.1080/00220272.2012.737861

Hildebrand, G. (2007). Diversity, values, and the science curriculum. In R. Gunstone, D. Corrigan, & J. Dillon (Eds.), *The re-emergence of values in science education* (pp. 43–57). Sense Publishers.

Jeannette, K., & Julialet, R. (2003). The role of values in school discipline. *Koers, 68*(4), 353–371. https://doi.org/10.4102/koers.v68i4.347

Magendanz, D. (2003). Conflict and complexity in value theory. *The Journal of Value Inquiry, 37*, 443-453. https://doi.org/10.1023/B:INQU.0000019038.46080.f3

Oeschger, T., Makarova, E., & Döring, A. K. (2022). Values in the school curriculum from teacher's perspective: A mixed-methods study. *International Journal of Educational Research, 3*, 100190. https://doi.org/10.1016/j.ijedro.2022.100190

Rhodes, B. & Roux, C. (2004). Identifying values and beliefs in an outcomes-based curriculum South African *Journal of Education, 24*, 1, 25-30.

Roux, C. J. & Dasoo, N. (2020). Pre-service teachers' perception of values education in the South African physical education curriculum. *South African Journal of Childhood Education, 10*(1), 1-8. https://doi.org/10.4102/sajce.v10i1.717

Roux, C, J. and Janse van Rensburg, N. 2017. An outdoor adventure programme infused with olympic values in teaching olympism to university students. *South African Journal for Research in Sport, Physical Education and Recreation 39*, 1–2, 63–77.

Schwartz, S. H. (2012). An Overview of the Schwartz theory of basic values. *Online Readings in Psychology and Culture, 2*(1). https://doi.org/10.9707/2307-0919.1116

Seewann, L., & Verwiebe, R. (2020). How do people interpret the value concept? Development and evaluation of the value conceptualisation scale using a mixed method approach. *Journal of Beliefs & Values, 41*(4), 419-432. https://doi.org/10.1080/13617672.2019.1707748

Simuforosa, M. & Rosemary, N. (2014). Learner indiscipline in schools. *Review of Arts and Humanities, 3*(2), 79-88. Available at http://rah-net.com/journals/rah/Vol_3_No_2_June_2014/6.pdf